



SPACE CENTER

Roundup

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NASA JSC-2002e27138 Photo by Robert Markowitz



Dress Rehearsal

At the Sonny Carter Training Facility (SCTF), an intricate system of teams works together to teach astronauts how to perform space walks. Here, Suit Technicians Chris Ganung, Kenny Dines and Carl Wright work to help outfit Astronaut Scott Parazynski, MD, before a training exercise at the SCTF's Neutral Buoyancy Laboratory. Parazynski describes the world's largest indoor swimming pool as 'Space minus the views – the ultimate simulator.' To read more about the SCTF, **please turn to page 4.**

BIG THINGS COME IN SMALL PACKAGES

By Joe Fries, White Sands Test Facility Manager



More than 700 miles from Houston, in the foothills of the San Andres mountains just east of Las Cruces in southwestern New Mexico, where the creepy, crawly critters are poised to sting or bite you and the cactus and mesquite are just waiting to stick you, lies the White Sands Test Facility (WSTF). This remote outpost, in the high Chihuahuan desert, is actually a proud member of the Johnson Space Center family.

It was not by chance that this high-tech installation was built in such a location. This is a place where the ancient and natural hazards are overshadowed by human-made space-age dangers, where loud noises, toxic chemicals, occasional explosions and rocket engine exhaust plumes billowing into the sky are a normal part of our everyday work environment. These activities are not at all compatible with a heavily populated urban area like Houston.

WSTF was therefore constructed in this isolated location to allow hazardous testing of propulsion systems on the Apollo Lunar Module and Service Module without endangering the nearby population or environment. Since that time, WSTF has supported every U.S. human exploration spaceflight program, and we continue to play a key role in supporting the shuttle and the International Space Station.

Although the “boom” days of Apollo are long past, the installation has not only withstood the test of time but also changed with the times. This enables us to provide continuing support to NASA’s programs, with a highly expanded mission that goes far beyond our early propulsion testing heritage.

With a workforce of only 53 civil servants and about 640 contractors, we do a lot with a little. Our self-sufficiency and the shorter lines of communication and command at this small facility have led to our hard-earned reputation for responsiveness, versatility and adaptability, in addition to the quality and cost-effectiveness of our work.

In addition to conducting static firing tests on rocket propulsion systems in large space-simulating vacuum chambers, resolving space mission anomalies and investigating the behavior of materials and components, the people at WSTF also:

- ❖ Perform Depot-level repair and refurbishment of space shuttle propulsion and life support system components
- ❖ Design and fabricate spaceflight hardware
- ❖ Validate redesigned or improved components to extend service life, enhance performance and improve mission safety

Other fascinating jobs at WSTF include:

- ❖ Working with special light-gas guns, which can propel 1-inch-diameter (2.54-cm-diameter) projectiles at velocities more than 4.35 miles/sec (7 km/sec) to simulate the impact of micrometeoroids or orbital debris on spacecraft components
- ❖ Creating large-scale controlled explosions to understand the detonation phenomena of solid and liquid rocket propellants
- ❖ Conducting tests to see how various materials burn and how fires propagate
- ❖ Testing new components that must operate in corrosive or highly reactive environments.
- ❖ Operating the White Sands Space Harbor, an alternate orbiter landing site, where shuttle astronauts are trained to perform the critical final approach and landing phase of the mission

Our capabilities for space-simulated vacuum firings of solid and liquid rocket propulsion systems are among the best in the nation. Similarly outstanding are our sophisticated laboratories used for evaluating potentially hazardous materials and components for both Earthly and aerospace applications. However, it is the experience, expertise and passion of the WSTF people that make us what we are today.

In addition to our highly technical test and evaluation role, WSTF also has a vibrant educational outreach program. For example, it was the success of the Science Advisor (SCIAD) Program at WSTF, which began more than a dozen years ago, that prompted JSC management to implement a similar program in Houston to educate and inspire both teachers and students in the fields of math and science.

There are many things that prompt us to stand tall and hold our heads high. WSTF was the first NASA facility to be certified to the quality management standard of ISO 9001, was the first to be certified to ISO 14001 and was recently designated an OSHA STAR site in recognition of the excellence of our safety program.

There are many other accomplishments that make us proud. What motivates us the most and keeps us striving for excellence is our universal belief that what we do does indeed make a significant difference in enabling the safe exploration and use of space. We are excited with the prospects for making future contributions to the American space program.

We feel privileged to be an integral part of the JSC team that is both figuratively and literally reaching for the stars! ❖

Center Director Message



KEEP THE FAITH

We were betrayed.

A safe with lunar and meteorite samples was stolen from our

Astomaterials Laboratory. The perpetrators gained access to the Center and entered a secure building to reach the safe. The stolen materials have been recovered and three former employees, a co-op and two interns, are facing criminal charges.

Even with the recovery of the materials, much damage has been done. Almost a lifetime’s work, 30 years of research notes and records belonging to one of our scientists, was cast away and lost. Also damaging were the apparent violations of trust by some of our team members, those to whom we had given our full confidence. We are all wounded by this – JSC as an institution, we as individuals. Because total integrity is the fabric that weaves together our professional relationships at this Center, that texture now has a tear in it, and we must ask, “What should be done about this?”

Here’s what I’m going to do: I am going to review our security procedures and to make sure that we have appropriate protection of Center property. That is part of my responsibilities as the Center Director. I expect all team members to review and comply with our set procedures for maintaining the integrity of cipher locks/combinations, computer code words, etc.

Otherwise, I’m going to keep the faith. I am convinced that this terrible occurrence was an aberration. I’m also convinced that the great majority of men and women on our team have the highest degree of honesty and integrity. I am not going to punish the many for the sins of a few by creating a series of new rules and regulations that would impede initiative and intellectual collaboration at this Center.

Here’s what we’re all about: INTEGRITY, PROFESSIONAL EXCELLENCE, RESPECT FOR ONE ANOTHER and COMMITMENT.

Let’s stay on course and keep the faith in each other and this great endeavor that we are about.

Beak sends...

FROM THE DESK OF LT. GEN. JEFFERSON D. HOWELL, JR.



Tommy Holloway

By Lisa Tidwell



Thirty-nine years ago, a new NASA engineer named Tommy Holloway stood outside of the old Mercury Mission Control in Florida.

As he watched Mercury 9 lift off with Gordon Cooper inside, Holloway's perspective about the space program forever changed.

"That was the first moment I realized that there was a human in there – a human with a mother, a father, a wife and a child," Holloway said at the STS-111/Expedition 4 postflight event in June.

At that event, the retiring International Space Station (ISS) Manager reminisced about his years of service to the U.S. Space Program. He also was presented the Exceptional Engineering Achievement Medal by NASA Administrator Sean O'Keefe.

Holloway was named ISS Manager in April 1999 after serving as the Space Shuttle Program Manager for nearly four years. He began his career with NASA in 1963, planning activities for Gemini and Apollo flights at what was then known as the Manned Spacecraft Center. He was a Flight Director in Mission Control for early space shuttle flights and became Chief of the office in 1985.

In 1989, he was named Assistant Director for the Space Shuttle Program for the Mission Operations Directorate. He served as Deputy Manager for Program Integration with the Space Shuttle Program and Director of the Phase I Program of Shuttle-Mir dockings before being named Space Shuttle Program Manager in 1995.

While his achievements are exceptional and his awards are numerous, Holloway leaves behind more than those accolades. His legacy is one of genuine concern for people. From that day he watched the Mercury 9 launch to his retirement last month, Holloway never lost sight of the space program's human element.

Holloway consistently infused his core values of safety, trust, integrity, respect for people and technical excellence into every aspect of his work.

"Tommy Holloway's unique experience and ability to excel in the performance of human spaceflight is a talent this Agency will miss," said Bill Gerstenmaier, who served as Holloway's Deputy and now heads the ISS Program. "His accomplishments are gigantic, and his honesty and decency are unparalleled."

Throughout his impressive career spanning four decades, Holloway saw many firsts at NASA, such as Ed White's first space walk, Apollo's first lunar flyby, the first human to walk on the surface of the Moon, Skylab, the first shuttle flight, the first docking of the Shuttle-Mir and the creation of the International Space Station.

When named the ISS Program Manager, Holloway was challenged with putting thousands of pieces of hardware into orbit, coordinating the activities of NASA's 16 international partners and managing about 20,000 personnel in the United States.

He met that challenge, as he did so many others in his career, and leaves NASA with an ISS Program possessing an impeccable safety record that successfully flew 24 missions in 24 months under his watch.

Paying tribute to Holloway, O'Keefe described the ISS as the "House that Tommy built." However, at that postflight event, Holloway didn't focus on his own achievements but rather those of the entire NASA family.

"To all of you in human spaceflight, be proud," he said. "You are a great team." ♦



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SPACE CENTER
Roundup

Sonny Carter Training Facility

Setting the stage for space walks

Story by Lisa Tidwell

"Thanks to all of the members of the NBL who made it possible for us to learn all of the techniques in the water tank for EVA activities in space."

—Astronaut Franklin Chang-Diaz, Ph.D., at the crew-return ceremony of STS-111

"Thanks" may seem a routine remark. However, when it comes from an astronaut who has completed a space walk, it is a sentiment cherished by the entire team at the Sonny Carter Training Facility (SCTF).

Much work goes on behind the scenes in Houston to ensure success in space. This feature spotlights the SCTF and the teams that work diligently to set the stage for astronauts to perform well-orchestrated space walks.

Who was M.L. 'Sonny' Carter, Jr.?

The entire facility was named for Astronaut M. L. "Sonny" Carter, who was instrumental in developing many of the current space-walking techniques used by the astronauts. On April 5, 1991, while traveling on NASA business, Carter died in a commercial airplane crash.

"Sonny was a driving force in a number of advances we made in the field of space medicine, particularly the evaluation of the Extravehicular Mobility Unit," former JSC Director Carolyn Huntoon, Ph.D., said at the SCTF dedication. "Sonny Carter left a lasting impression on the Johnson Space Center and our nation's space program."

To learn more about Carter, his astronaut biography is located at: <http://www.jsc.nasa.gov/Bios/htmlbios/carter.html>

The facilities

The SCTF is comprised of three buildings:

Neutral Buoyancy Laboratory (NBL)

Many NBL visitors are surprised by the immense size of this famous pool as they stand on the observation deck. In the world's largest indoor pool, space walks are the focus. "We have the ability to train astronauts in a simulated space environment here on Earth," said Robert Durkin, Facility and Operations Manager at the NBL. More than 200 employees, including 60 core divers, work there.

Logistics and Mock-up Facility (LMF)

Housed at the LMF are the suit and tool labs. "All of the processing of the suits, buildup, maintenance, modifications for each crew member and all the functional testing is done here," said Don Smith of the Extravehicular Mobility Unit (EMU) Training Lab.

Software Development and Integration Laboratory (SDIL)

About 150 people work at the facility; most are contract employees of Boeing. Many facilities are housed in the SDIL including: ISS Power Laboratory, Integrated Test Rig, Hardware/Software Integration Lab, Software Verification Facility, Prime Software Development Facility and Mission Build Facility. Test and verification of all ISS flight software is done at the SDIL. "In a nutshell, SDIL is the integration and verification facility for the avionics software of the ISS," said Allen Brewer, SDIL Facility Manager.

It takes teamwork

In place at the SCTF is an intricate system of teams working together to teach astronauts how to perform space station assembly tasks, which are the most extensive and complex space walks ever attempted.

Those teams are:

Astronauts:

Perform space walk and bailout training at the NBL.

Breathing Gas System (BGS) Group:

Produces and controls all of the breathing gas, Nitrox, which the divers use.

Communications Operators:

Monitor the communication systems during water tests.

Divers (Safety/Utility/Camera):

Help the suited subjects with all of their tasks. There is a minimum of four divers per suited subject.

Engineering Group:

Works with designing the shuttle and station mockups.

Environmental Control System (ECS) Group:

Ensures test subjects receive adequate suit conditions.

Integration Engineering Team (IET):

Decides the configuration of the pool for a set of tests and generates animation of the test configurations to check layout and clearances.

Long Range Planning Group:

Schedules the training events that go into the tank.

Mockup Maintenance Group:

Performs planned and unplanned maintenance on the mockups.

Medical Team:

Physically examines test subjects and divers before each test. Always present while divers are in the water to ensure health and safety.

Reconfiguration Group:

Works in the evening to reconfigure the pool for the next-day training sessions.

Robotic Arm Team:

Takes care of the maintenance repair and testing of the shuttle and space station remote manipulator system (SRMS, SSRMS).

Suited Subjects:

An astronaut or engineer in the EMU.

Suit Team:

Works to ensure the EMU or suit is in top condition for each suited subject.

Test Conductor (TC):

Stays with an assigned crew while training for a space walk. Gives the training manager input.

Test Director (TD):

Ensures everything runs smoothly, such as environmental control systems, gas flow, cooling to suit and communications.

Test Safety Officer:

Ensures test safety during the training in the pool.

Tool Team:

Provides tools for the training events (these tools are downgraded flight units that are used for training).

Topside Monitors:

Watch from the pool deck during tests and ensure the safety of the divers.

A closer look: Divers

Divers are the backbone of the system and work in one of three major roles: A utility diver, a camera diver or a safety diver. "The divers are the lifelines, teachers and coaches for the astronauts while training for a space walk," said NBL Director Ernest Becker.

Through the divers, the astronauts are taught how to open hatches, use tools and move in the weightless environment at the SCTF. "Most of the task training and timeline training are done at the NBL," said Lisa Spence, an NBL Flight Lead.

The team determines the most efficient and convenient way to perform tasks needed for a space walk. The flight lead puts together a rough procedure, but it is not until the divers hit the water that the orchestration takes form.

Astronaut Scott Parazynski, MD, said the divers are as knowledgeable as they are helpful. "They work with (space-walk) training everyday, and they can tell right away if you are developing a bad habit and they help you correct it," he said. "They are really good teachers."

A special bond

Members from all of the SCTF teams exude pride when discussing their work. "The astronauts come back and say, 'Thanks for that little technique you showed me,'" Diver Bill Radford said with a smile.

To watch an astronaut perform a space walk that has been rehearsed repeatedly at the SCTF is a powerful moment for all at the facility. "While watching space walks," Diver Ashley Porter said, "we can take a step back from the everyday work and realize what it is we are doing."

Dr. Parazynski, who has flown four missions and performed more than 20 hours of space walks, said the SCTF team is never forgotten when it is show time in space.

"They are part of your team," he said, "and you wish they were there." ♦

NBL AT A GLANCE

- ♦ On May 19, 1997, the NBL officially opened
- ♦ The NBL pool, at 40 feet deep by 102 feet wide by 202 feet long, is still not large enough to fit the completed space station, which will be 350 feet by 240 feet
- ♦ The pool is centered at ground level, making it 20 feet below ground and 20 feet above
- ♦ It contains 6.2 million gallons of water
- ♦ The temperature is kept around 86 degrees for the divers' comfort
- ♦ Water in the pool recycles every 19.5 hours
- ♦ The NBL is 12 times larger than the Weightless Environment Training Facility it replaced
- ♦ The 500 truckloads of cement it took to pour foundation stopped traffic all the way to I-45
- ♦ It took more than one month to fill the pool
- ♦ The NBL is fully outfitted and large enough to run two training exercises at a time
- ♦ The pool is ideal for training astronauts on specific jobs that only require particular hardware pieces
- ♦ Astronauts spend seven hours in the water training per one hour of a space walk on orbit
- ♦ In a traditionally male-dominated field, the NBL Dive Team is proud to have eight women recently join the ranks
- ♦ Astronaut Jerry Ross, former chair of the NBL Operational Readiness Inspection committee, was the first suited astronaut to dive into the pool
- ♦ The entertainment industry has used the facilities in the filming of *Armageddon* and *Space Cowboys*

The photos on the right capture just some of the work that goes on at the Sonny Carter Training Facility:

- Don Smith inspects the latches on a space suit helmet. All suits are thoroughly inspected prior to hitting the water.**
- Divers keep a close watch on all astronauts practicing for space walks in the NBL to ensure their safety.**
- Patrick Santana attaches the tools that Astronaut John Herrington will need for his space walk during STS-113.**
- Diver George Dyson takes a moment to brief STS-113 Pilot Astronaut Christopher 'Gus' Loria on the day's test procedures.**
- Test Directors monitor the space walk training from one of two control rooms directly above the pool.**



NASA JSC-2002e27132 Photo by Robert Markowitz



NASA JSC-2002-00507



NASA JSC-2002e27153 Photo by Robert Markowitz



NASA JSC-2002e27501 Photo by Robert Markowitz



NASA JSC-2002e27503 Photo by Robert Markowitz

Expedition 4 Returns

By Lisa Tidwell

Expedition 4 Commander Yuri Onufrienko and Flight Engineers Daniel Bursch and Carl Walz returned to Earth June 19 after a record-setting stay on the International Space Station.

Below are some highlights from their mission:

- ◆ During Expedition 4's 196 days in space, Walz and Bursch broke the U.S. spaceflight endurance record. The previous record was 188 days, which was held by Astronaut Shannon Lucid.
- ◆ Walz holds the U.S. record for most cumulative time in space with 231 days, and Bursch is second with 227 days. This was Onufrienko's second long-duration flight, giving him a total of 389 days.
- ◆ The Expedition 4 crew performed three space walks, including the first space walk to be based out of Quest (the airlock that accommodates either Russian or U.S. spacesuits) without a space shuttle docked to the station.
- ◆ STS-110 delivered the 43-foot-long S0 Truss – the backbone for future station expansion – to the ISS. The S0 Truss is the first of nine pieces that will make up the station's external framework, which will eventually stretch 356 feet.
- ◆ The most ISS science experiments, 27, took place during Expedition 4's watch.
- ◆ A ferry crew brought 4S, the fourth Soyuz spacecraft parked to the ISS.
- ◆ Expedition 4's first space walk, on Jan. 14, lasted six hours and three minutes. Onufrienko and Walz relocated the cargo boom for the Russian Strela crane and installed an amateur radio antenna onto the end of the Zvezda Service Module.
- ◆ During Expedition 4's second space walk, Jan. 25, Onufrienko and Bursch installed six deflector shields for the Zvezda Service Module's jet thrusters. Also, they installed an amateur radio antenna, attached four science experiments, and retrieved and replaced a device to measure material from the thrusters.
- ◆ The crew returned to Earth aboard *Endeavour*, landing on runway 22 at Dryden Flight Research Center, Edwards Air Force Base, Calif. Three days of unfavorable weather conditions at KSC prompted the decision to land at Edwards, which enjoyed pristine, dry conditions.

To read **Astronaut Dan Bursch's** 120-day report about his experiences aboard the ISS, please visit:
<http://spaceflight.nasa.gov/station/crew/exp4/120days.html>

To read what **Astronaut Carl Walz** had to say about his Feb. 20, 2002, space walk, please visit:
<http://spaceflight.nasa.gov/station/crew/exp4/eva/spacewalking.html>



- A. Astronaut Carl E. Walz, Expedition 4 flight engineer, catalogs canisters of water in the Zvezda Service Module on the ISS.
- B. Expedition 4 Commander Yuri I. Onufrienko welcomes Soyuz 4 visitors South African space flight participant Mark Shuttleworth (left) and flight engineer Roberto Vittori of the European Space Agency (right).
- C. Walz performs his duties while living aboard the ISS.
- D. Astronaut Daniel W. Bursch, flight engineer, and Onufrienko (right) perform maintenance on equipment in the Zvezda Service Module.



American Heritage

As this patriotic event flyer indicates, national pride was at the heart of this year's American Heritage Day Celebration at Johnson Space Center.

This year's activity honored the members of the JSC team who are serving or had served in the U.S. military and/or the children of our JSC team currently in the service. In addition, homeland defenders of our safety – firefighters, members of law enforcement and emergency medical service personnel – were honored.

Coordinated by the Equal Opportunity Programs Office and Team NASA, the June 26 event was an overwhelming success. These photos capture some of the activities that happened that day.

Top right photo: JSC Center Director Lt. Gen. Jefferson Howell, Jr. (USMC, Ret.) recognizes two of the children who created a safety pin flag commemorating 9/11. Howell also spoke at the event about the importance of appreciating one's heritage.

Center right photo: Teresa Page looks at a wall of portraits showing NASA military veterans.

Bottom right photo: James McGee (right) and Harvey Trigg (in truck), of the Society for the Preservation and Appreciation of Antique Fire Fighting Apparatus of America, pose with one of three fire engines that made an appearance during the celebration.

Photos by James Blair
Poster by David Russell



TEAM NASA

UNITED WE STAND!

**OUR HOMELAND!
OUR PRIDE!
OUR AMERICAN HERITAGE!
JOIN US...**

as we celebrate
our USA and those
serving our country
and representing our
American heritage!

AMERICAN HERITAGE DAY

June 26, 2002 11 am – 1 pm
TEAGUE AUDITORIUM

- Guest Speakers
- Men and Women of Our Military,
- Law Enforcement and Fire Department Exhibit
- Hot Dogs, Desserts, Sodas, and much more!



NASA JSC 2002e26819



NASA JSC 2002e26813



NASA JSC 2002e26815



NASA JSC 2002e26821



NASA JSC 2002e26822

At left, Ian Martin of the Houston Highlanders plays the bagpipes at the event. Martin has performed at every American Heritage event, where it is a tradition for the Highlanders to close the program each year. Above, Kelsey Robison (left), Jordan Fields (center) and Malory Fields (right) receive an autograph from NASA Astronaut Dom Gorie.

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